

# Notice of Allowability

Application No.

09/974,043

Examiner

Kallambella Vijayakumar

Applicant(s)

BARKER ET AL.

Art Unit

1751

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 08/16/2004.
2. ☒ The allowed claim(s) is/are 94-117.
3. ☐ The drawings filed on \_\_\_\_\_ are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All   b) ☐ Some\*   c) ☐ None   of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

## Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

  
Mark Kopec  
Primary Examiner

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**EXAMINER'S AMENDMENT**

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An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Michael Ross on September 21, 2004.

The application has been amended as follows:

**CANCEL Claims 70-93**

**ADD NEW Claims 94-117**

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94 (NEW): A battery, comprising:

a positive electrode comprising positive electrode active material particles having an inner region and an outer region, wherein the inner region comprises a cubic spinel lithiated manganese oxide, and the outer region comprises  $A_2MnO_3$ , wherein A is an alkali metal other than lithium (Li);

the battery further comprising a negative electrode; and

an electrolyte.

95 (NEW): The battery according to Claim 94, wherein the cubic spinel lithiated manganese oxide is represented by the formula  $\text{Li}_{1+x}\text{Mn}_{2-x}\text{O}_4$ , wherein  $0 \leq x < 0.2$ .

96 (NEW): The battery according to Claim 95, wherein  $0.081 \leq x < 0.2$ .

97 (NEW): The battery according to Claim 96, wherein A is Na.

98 (NEW): The battery according to Claim 94, wherein A is Na.

99 (NEW): The battery according to Claim 94, wherein the negative electrode comprises an intercalation active material.

100 (NEW): The battery according to Claim 99, wherein the intercalation active material is graphite.

101 (NEW): The battery according to Claim 99, wherein the electrolyte comprises a solvent selected from the group consisting of gamma-butyrolactone, tetrahydrofuran, propylene carbonate, vinylene carbonate, ethylene carbonate, dimethyl carbonate, diethyl carbonate, butylene carbonate, methyl-ethyl carbonate, dipropyl carbonate, dibutyl carbonate, diethoxy ethane, ethyl-methyl carbonate, dimethoxyethane, and dioxolane.

102 (NEW): The battery according to Claim 94, wherein the positive electrode active material is prepared by a process comprising the step of reacting starting material cubic spinel lithiated manganese oxide particles with an alkali metal compound for a time and at a temperature sufficient to oxidize at least a portion of the  $\text{Mn}^{+3}$  in the cubic spinel starting material particles to  $\text{Mn}^{+4}$ , wherein the alkali metal compound contains an alkali metal other than lithium (Li).

103 (NEW): The battery according to Claim 102, wherein the positive electrode active material is characterized by a lattice parameter 'a' that is larger than the lattice parameter 'a' of untreated spinel lithiated manganese oxide particles.

104 (NEW): The battery according to Claim 102, wherein the positive electrode active material is characterized by a lattice parameter 'a' that is smaller than the lattice parameter 'a' of untreated spinel lithiated manganese oxide particles.

105 (NEW): The battery according to Claim 102, wherein the alkali metal compound is selected from the group consisting of alkali metal carbonates, metal oxides, hydroxides, sulfates, aluminates, phosphates and silicates.

106 (NEW): The battery according to Claim 102, wherein the alkali metal compound is an alkali metal phosphate.

107 (NEW): The battery according to Claim 102, wherein the alkali metal compound is an alkali metal hydroxide.

108 (NEW): The battery according to Claim 102, wherein the alkali metal compound is an alkali metal carbonate.

109 (NEW): The battery according to Claim 102, wherein oxidation to  $\text{Mn}^{+4}$  occurs at the surface of the starting material cubic spinel lithiated manganese oxide particles.

110 (NEW): The battery according to Claim 102, wherein the step of reacting starting material cubic spinel lithiated manganese oxide particles with an alkali metal compound is carried out at a temperature of between 600°C and 750°C.

111 (NEW): The battery according to Claim 102, wherein the starting material is represented by the formula  $\text{Li}_{1+x}\text{Mn}_{2-x}\text{O}_4$ , wherein  $0 \leq x \leq 0.2$ .

112 (NEW): The battery according to Claim 111, wherein  $0.081 \leq x < 0.2$ .

113 (NEW): The battery according to Claim 111, wherein A is Na.

114 (NEW): The battery according to Claim 102, wherein A is Na.

115 (NEW): The battery according to Claim 102, wherein the negative electrode comprises an intercalation active material.

116 (NEW): The battery according to Claim 115, wherein the intercalation active material is graphite.

117 (NEW): The battery according to Claim 115, wherein the electrolyte comprises a solvent selected from the group consisting of gamma-butyrolactone, tetrahydrofuran, propylene carbonate, vinylene carbonate, ethylene carbonate, dimethyl carbonate, diethyl carbonate, butylene carbonate, methyl-ethyl carbonate, dipropyl carbonate, dibutyl carbonate, diethoxy ethane, ethyl-methyl carbonate, dimethoxyethane, and dioxolane.--

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**REASONS FOR ALLOWANCE**

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The following is an examiner's statement of reasons for allowance:

Claims 94-117 are allowed as amended, as the amended claims incorporate all the limitations of the allowed claims, and over non-finding of any new prior art in a revised search, and over the prior art of record that neither teaches nor fairly suggestive of a battery comprising of a positive electrode comprising a positive electrode material, particularly, the core and shell material having a core of cubic spinel lithiated manganese oxide and an outer shell comprising a composition with the formula,  $A_2MnO_3$ , wherein A- is an Alkali Metal other than Lithium, meeting the limitations of the instant claims by the applicants.


Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kallambella Vijayakumar whose telephone number is 571-272-1324. The examiner can normally be reached on M-Th, 07.00 - 16.30 hrs, Alt. Fri: 07.00-15.30 hrs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMV  
September 21, 2004.

  
Mark Kopec  
Primary Examiner